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[ ] a c-i-p application of S.N. \_\_\_\_\_ filed \_\_\_\_\_

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For: INFORMATION PROCESSING METHOD AND INFORMATION  
PROCESSING APPARATUS

Enclosed are:

- ☒ 10 sheets of drawings. (Figs. 1-10)  
☒ Specification, including claims and abstract (19 pages)  
☒ Declaration  
☒ An assignment of the Invention to FUJITSU LIMITED  
☒ A certified copy of Japanese Application No. 10-128835  
☒ An associate power of attorney  
☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27  
☒ Post card  
☒ Recording fee (as indicated below)  
☐ Information Disclosure Statement, PTO-1449, copies of \_\_\_\_\_ references  
☐ Other \_\_\_\_\_  
☐ Other \_\_\_\_\_

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TOTAL CLAIMS	3 - 20 =	0
INDEP CLAIMS	2 - 3 =	0
[ ] MULTIPLE DEPENDENT CLAIMS PRESENTED		

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RATE	FEE
	\$395
x 11 =	\$
x 41 =	\$
x 135 =	\$
TOTAL	\$

OTHER THAN A SMALL ENTITY	
RATE	FEE
	\$790
x 22 =	\$
x 82 =	\$
x 270 =	\$
TOTAL	\$
	790

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Respectfully Submitted,

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INFORMATION PROCESSING METHOD AND  
INFORMATION PROCESSING APPARATUS

5 BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an information processing method and an information processing apparatus, having an SDL (specification and description language) execution unit described in SDL, an external environment description unit described in a programming language other than SDL, and an OS (operating system).

The SDL is based on CEFMS (communicating extended finite-state machine) of ITU-T Recommendations and is used to describe the specifications of information processing equipment such as exchanges. There are many programs described in other programming languages such as C and C++. There is a necessity of properly integrating programs described in SDL with programs described in other languages.

2. Description of the Related Art

SDL execution units contained in an SDL block are executed as tasks of an OS (operating system). If the number of the SDL execution units is large, the overhead of the OS increases because the OS must create tasks for the SDL execution units. An increase in the overhead of the OS causes a problem in a system such as a telephone exchange system that must secure real-time processing.

Communication between the SDL execution units and an external environment description unit and communication among the SDL execution units are controlled by communication controllers of the OS. If the numbers of signals handled by the communication controllers increase, the overhead of the OS also increases.

The external environment description unit must

define signals such that the signals are easy to handle for the SDL execution units. The external environment description unit, therefore, is unable to form its own data group.

5 SUMMARY OF THE INVENTION

An object of the present invention is to integrate an external environment description unit with an SDL execution unit and assign a task of an OS to the integrated unit, to reduce the overhead of the OS.

10 In order to accomplish the object, a first aspect of the present invention provides an information processing method for use with an SDL execution unit described in SDL, an external environment description unit described in a programming language other than SDL, and an adapter.  
15 The adapter has a pseudo internal signal generator and a queue manager. The method includes the steps of connecting the external environment description unit and the SDL execution unit to each other through the adapter so that signals containing messages, events, and  
20 parameters may be exchanged between them through the adapter; assigning a task of an OS to the external environment description unit; and executing the task so that the pseudo internal signal generator may convert and transfer the signals between the external environment  
25 description unit and the SDL execution unit.

A second aspect of the present invention provides an information processing method for use with an SDL execution unit described in SDL, an external environment description unit described in a programming language  
30 other than SDL, and an adapter. The adapter has a pseudo internal signal generator and a queue manager. The method includes the steps of connecting the external environment description unit and the SDL execution unit to each other through the adapter so that signals  
35 containing messages, events, and parameters may be exchanged between them through the adapter; receiving information to be transferred to the SDL execution unit

from the external environment description unit, the information being received as function parameters for the pseudo internal signal generator; converting the information by the pseudo internal signal generator into signals to be supplied to the SDL execution unit; transferring the converted signals to the queue manager; monitoring an internal queue of the queue manager; and activating, if the internal queue is holding the converted signals, the SDL execution unit by function call so that the activated SDL execution unit may fetch the converted signals from the internal queue and carry out processes accordingly.

A third aspect of the present invention provides an information processing apparatus for processing information under the control of a task assigned by an operation system. The apparatus has an adapter for connecting an SDL execution unit described in SDL and an external environment description unit described in a programming language other than SDL to each other so that signals may be transferred between them through the adapter under a task of the operation system assigned to the external environment description unit. The adapter has a pseudo internal signal generator and a queue manager. The pseudo internal signal generator separates, integrates, and converts signals to be transferred between the SDL execution unit and the external environment description unit. The queue manager has an internal queue for holding the signals to be transferred between the SDL execution unit and the external environment description unit.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above object and features as well as other features of the present invention will be more apparent from the following description of the preferred embodiments with reference to the drawings, wherein:

Fig. 1 shows essential part of an embodiment of the present invention;

Fig. 2 explains a signal separating function of the embodiment;

Fig. 3 explains a signal integrating function of the embodiment;

5 Fig. 4 explains an operation of the embodiment;

Fig. 5 explains another operation of the embodiment;

Fig. 6 shows a sequence of operations of the embodiment;

10 Fig. 7 explains a normal operation of the embodiment;

Fig. 8 explains a separating operation of the embodiment;

Fig. 9 explains an integrating operation of the embodiment; and

15 Fig. 10 shows a prior art.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

For better understanding of the present invention, an information processing method according to a prior art will first be described with reference to Fig. 10.

20 The prior art has an external environment description unit 71 (hereinafter referred to as the environment unit 71), an SDL block 72, an operation system (OS) 73, a signal generator 74, a signal receiver 75, SDL execution units 76-1 to 76-n, and OS  
25 communication controllers 77-1 and 77-2.

The prior art is applicable to information processing equipment such as an exchange. In this case, the OS 73 serves as a central controller for controlling respective parts, and the environment unit 71 transmits  
30 and receives control information to and from subscribers and processes the control information. The environment unit 71 is described in a programming language such as C or C++.

The SDL block 72 contains the SDL execution units  
35 76-1 to 76-n each of which represents a service described in SDL (specification and description language). The services provided by the SDL execution units are, for

example, central control, speech channel switching, and accounting functions. The SDL includes SDL/GR (SDL graphical representation) and SDL/PR (SDL phrase representation). The environment unit 71 serves as an external environment for the SDL execution units 76-1 to 76-n and is described in a programming language other than SDL.

Basic operations carried out between the environment unit 71 and the SDL block 72 (SDL execution units 76-1 to 76-n) are activation and information exchange both based on signals. Accordingly, the OS 73 assigns tasks A to X to the environment unit 71 and SDL execution units 76-1 to 76-n, respectively. Signal transfer between, for example, the environment unit 71 and the SDL execution units 76-1 and 76-2 is carried out through a queue in the communication controller 77-1 under the control of the OS 73. Similarly, signal transfer between the SDL execution units, for example, 76-1 and 76-2 is carried out through a queue in the communication controller 77-2 under the control of the OS 73.

In this way, the SDL block 72 is described in SDL for providing various services, and the environment unit 71 has existing parameters, etc., and serves as an external environment for the SDL block 72. Since the environment unit 71 is described in a programming language other than SDL, it is impossible to directly transfer signals between the SDL block 72 and the environment unit 71.

Accordingly, the communication controllers 77-1 and 77-2 controlled by the OS 73 must mediate between the SDL block 72 and the environment unit 71. At this time, the OS 73 must assign tasks A to X to the environment unit 71 and SDL execution units 76-1 to 76-n, respectively.

If the number of the SDL execution units is large, the number of the tasks assigned to them increases accordingly, to increase the overhead of the OS 73. This causes a problem in a system such as a telephone exchange

system that must secure real-time processing.

Signal transfer between the environment unit 71 and the SDL execution units 76-1 to 76-n, or between the SDL execution units is carried out through the communication controllers 77-1 and 77-2 controlled by the OS 73. If the number of signals to be transferred increases, the overhead of the OS 73 increases as in the case of assigning tasks.

In addition, the environment unit 71 must define signals such that the signals may easily be handled by the SDL execution units, and therefore, it is not easy for the environment unit 71 to form its own data group.

Next, preferred embodiments of the present invention will be explained.

Figure 1 shows essential part of an embodiment of the present invention. The embodiment has an external environment description unit 1 (hereinafter referred to as the environment unit 1), an SDL execution unit 2, an operation system (OS) 3, and an adapter 4. The adapter 4 includes a pseudo internal signal generator 5 and a queue manager 6.

The environment unit 1 is described in a programming language, such as C or C++, other than SDL. The environment unit 1 is executed as an execution task assigned by the OS 3. This execution task covers the SDL execution unit 2 as well. The environment unit 1 and SDL execution unit 2 are combined together by, for example, a function call. To realize this, the adapter 4 has the pseudo internal signal generator 5 and queue manager 6. Although the SDL execution unit 2 shown in Fig. 1 is single, actual practice involves a plurality of SDL execution units that are connected to internal queues of the queue manager 6.

The pseudo internal signal generator 5 converts a signal (a) that may contain messages, events, parameters, etc., received from the environment unit 1 into a signal (a') suitable for SDL. The signal (a') is set in an

internal queue of the queue manager 6. The queue manager 6 monitors whether or not a signal is present in the internal queue, and if a signal is present, activates the SDL execution unit 2 by a function call. The activated  
5 SDL execution unit 2 fetches the signal (a') from the internal queue of the queue manager 6. A signal (b) from the SDL execution unit 2 is transferred to the pseudo internal signal generator 5 through the queue manager 6 and is converted into a signal (b') for the environment  
10 unit 1. The signal (b') is transferred to the environment unit 1.

In this way, information to be transferred to the SDL execution unit 2 from the environment unit 1 is transmitted as a function parameter for the pseudo  
15 internal signal generator 5. Then, the information is converted into a signal (a'), which is transferred to the queue manager 6. The queue manager 6 monitors the internal queue, and if the signal (a') is present in the internal queue, activates the SDL execution unit 2 by a  
20 function call.

The activated SDL execution unit 2 fetches the signal (a') from the internal queue and carries out a process accordingly. When the process is settled, the queue manager 6 takes control. The queue manager 6  
25 monitors the internal queue, and if there is no signal in the queue, control is handed over to the environment unit 1 that is being executed as a task of the OS 3.

When the SDL execution unit 2 has a signal (b) to be sent to the environment unit 1, the queue manager 6  
30 fetches the signal (b), and the pseudo internal signal generator 5 converts the signal (b) into a signal (b'), which is transferred as a function return value or an output pointer to the environment unit 1 that is operating under a task of the OS 3.

35 In this way, the present invention operates the environment unit 1 as a task of the OS 3 and combines the SDL execution unit 2 with the environment unit 1 through



the adapter 4. Even if there are many SDL execution units 2, there is no need of assigning OS tasks to the SDL execution units, respectively. Even if there are many signals to be transferred between the environment unit 1 and the SDL execution units or between the SDL execution units, communication controllers of the OS 3 are irrelevant to the signal transfer. As a result, there is no increase in the overhead of the OS 3 due to task assignment and signal transfer.

Figure 2 shows a signal separation function according to the embodiment of the present invention. The environment unit 1 has a pointer 11 that indicates, for example, an information unit 12. The information unit 12 is going to be transferred to the SDL execution unit 2 and contains several signal elements. The signal elements may include an initial addressing message IAM, an addressing completion message ACM, a release message REL, related information, etc. According to input parameters, the pseudo internal signal generator 5 separates the information unit 12 into an information unit 15-1 containing information "a" and an information unit 15-2 containing information "b." The information units 15-1 and 15-2 transfer the information pieces "a" and "b" to the internal queue 16 of the queue manager 6.

ISUP (ISDN User Part) of ITU-T Recommendations presently specifies forty-five standardized messages. For example, an initial addressing message IAM is standardized as code 01(h) ((h) representing hexadecimal notation), addressing completion message ACM as code 05(h), release message REL as code 0c(h), answer message ANM as code 09(h), connection message CON as code 07(h), and release completion message RLC as code 10(h).

In response to the information pieces "a" and "b" in the internal queue 16, the queue manager 6 activates the SDL execution unit 2, which fetches the information pieces "a" and "b" from the internal queue 16. Then, the SDL execution unit 2 becomes ready to receive the

messages IAM and ACM. In this case, there is no need for the OS 3 to create tasks for each transfer of signals, and therefore, there is no increase in the overhead of the OS 3.

5           Figure 3 shows a signal integrating function according of the embodiment of the present invention. The same reference numerals as those of Fig. 2 represent like parts. Figure 3 additionally shows pointers 11-1 and 11-2, a main information unit 12-1, additional  
10   information units 12-2 and 12-3, information units 15-1 and 15-2, internal queues 16-1 and 16-2, and cases 2a and 2b contained in the SDL execution unit 2.

          The main information unit 12-1 in the environment unit 1 includes a message such as the initial addressing  
15   message IAM, addressing completion message ACM, or release message REL, and information "a" corresponding to the message. The additional information units 12-2 and 12-3 contain additional information "b" and "c" related to the information "a" serving as a main signal. The  
20   additional information unit 12-2 is linked to the main information unit 12-1, and the additional information unit 12-3 is indicated with the pointer 11-1.

          The pointer 11-2 indicates the main information unit 12-1, and the information "a" is transferred as a main  
25   signal to the information unit 15-1 in the pseudo internal signal generator 5. The additional information unit 12-2 linked to the main information unit 12-1 transfers the additional information "b" to the information unit 15-2 in the pseudo internal signal  
30   generator 5. The information "a" serving as the main signal contains link information for the additional information "b." These operations relate to the case 2a of the SDL execution unit 2.

          According to input parameters, the pseudo internal  
35   signal generator 5 becomes ready to transfer the information "a" as a main signal through the internal queue 16-1 to the SDL execution unit 2 activated by the

queue manager 6. The SDL execution unit 2 advances process steps from, for example, a reception of the initial addressing message IAM, refers to the link information added to the main signal to see the additional information "b" of the additional information unit 15-1, and continues to process steps.

The case 2b of the SDL execution unit 2 will be explained. The pointer 11-2 indicates the main information unit 12-1, and the pointer 11-1 indicates the additional information unit 12-3. The information "a" of the main information unit 12-1 is transferred to the information unit 15-1, and the additional information "c" of the additional information unit 12-3 corresponding to the information "a" is transferred to the information unit 15-2. The pseudo internal signal generator 5 transfers the information "a" as a main signal through the internal queue 16-2 to the SDL execution unit 2 activated by the queue manager 6. The additional information "c" is also transferred to the SDL execution unit 2 through the internal queue 16-2. The case 2b of the SDL execution unit 2, therefore, advances process steps from a reception of the initial addressing message IAM to the next process step and to a reception of additional information ADD-INF.

Figure 4 shows an operation of the embodiment of the present invention. This figure shows the environment unit 1, SDL execution unit 2, OS 3, and adapter 4. The adapter 4 has a signal reception unit 21, an activation unit 22, a signal generator 23, a signal output unit 24, and a queue 25. The signal generator 23 and signal output unit 24 are included in the signal reception unit 21.

The signal generator 23 and signal output unit 24 provide the function of the pseudo internal signal generator 5 of Fig. 1. The activation unit 22 provides the function of the queue manager 6 of Fig. 1. The environment unit 1 is described in C or C++ language, and

the SDL execution unit 2 is described in SDL.

The environment unit 1 is executed as a task of the OS 3. Control is handed over to the signal reception unit 21 from the environment unit 1 by function call. At this time, the execution task hands over data (a) to the SDL execution unit 2 as an argument of a function f(a). The signal generator 23 converts the received data (a) into a signal (a') that can be received by the SDL execution unit 2. The signal output unit 24 links the converted signal (a') to the queue 25.

The activation unit 22 monitors the queue 25, and if the queue 25 is holding a signal, activates the SDL execution unit 2. The SDL execution unit 2 fetches the signal (a') from the queue 25, and the SDL execution unit 2 advances process steps accordingly. When the SDL execution unit 2 reaches a step of waiting for the next signal, control is returned to the activation unit 22. These operations are repeated to process information without assigning tasks of the OS 3 to the SDL execution unit 2.

Figure 5 shows another operation of the embodiment of the present invention. This figure shows only the SDL execution unit 2 and adapter 4 of Fig. 4. As explained above, the signal generator 23 converts a signal (a) into a signal (a') to be transferred to the SDL execution unit 2. The signal (a') is transferred from the signal output unit 24 to the queue 25. The activation unit 22 monitors the queue 25 and activates the SDL execution unit 2. The activated SDL execution unit 2 fetches the signal (a') from the queue 25. If the SDL execution unit 2 generates a signal (b), this signal is transferred to the queue 25.

Figure 6 shows a sequence of processes of the embodiment of the present invention. This example shows a credit-card call service. In the explanation, an exchange that handles a calling party is a "front station," and an exchange that handles a called party is a "rear station." The function that realizes the credit-

card call service may be provided for the front station, the rear station, or an intermediate station between the front and rear stations. This function is described in SDL and the other functions in C++.

5       The functions described in C++ are in the environment unit 1 of Figs. 1 to 4, and the function described in SDL is in the SDL execution unit 2 of Figs. 1 to 5. Between the environment unit 1 and the SDL execution unit 2, there is arranged the adapter 4 of  
10       Figs. 1 to 5 consisting of the pseudo internal signal generator 5 and queue manager 6. Thick arrows of Fig. 6 indicate signals transferred from the adapter 4 to the SDL execution unit 2.

15       When the calling party lifts the phone, the front station detects the same and returns a dial tone. The calling party recognizes the dial tone and dials a service access code to make a credit-card call service request. The front station recognizes the code, forms an initial addressing message IAM corresponding to the code,  
20       and sends the message IAM. The message IAM contains information such as a calling party number necessary for setting a call.

25       The environment unit 1 receives the message IAM, separates or integrates a main signal and additional information as explained with reference to Figs. 2 and 3, and transfers the information to the pseudo internal signal generator 5, which transfers it to the SDL execution unit 2.

30       The pseudo internal signal generator 5 generates in, for example, the signal generator 23 (Fig. 4) an initial addressing message IAM for the SDL execution unit 2 according to the received message IAM and puts the generated message in the queue 25. The activation unit 22 monitors the queue 25 and activates the SDL execution  
35       unit 2. The activated SDL execution unit 2 fetches the message IAM from the queue 25.

      In response to the message IAM, the SDL execution

unit 2 returns an addressing completion message ACM and an answer message ANM to the environment unit 1. The environment unit 1 transfers the messages ACM and ANM to the front station. The process steps in the credit-card call service advance, and the SDL execution unit 2 sends an announcement request REQ1 to the environment unit 1.

In response to the request REQ1, the environment unit 1 sends an announcement of, for example, "Please input the card number" to the calling party through the front station.

In response to the announcement, the calling party inputs the number of the credit card. The front station transfers the card number to the pseudo internal signal generator 5, which transfers the card number to the SDL execution unit 2 through the queue manager 6. In response to the card number, the SDL execution unit 2 returns an announcement request REQ2 to the environment unit 1.

In response to the request REQ2, the environment unit 1 sends an announcement of, for example, "Please input the personal number" to the calling party through the front station.

In response to the announcement, the calling party inputs a personal number (subscriber ID). The front station transfers the personal number to the pseudo internal signal generator 5, which transfers it to the SDL execution unit 2 through the queue manager 6. In response to the personal number, the SDL execution unit 2 returns an announcement request REQ3 to the environment unit 1.

In response to the request REQ3, the environment unit 1 sends an announcement of, for example, "Please input a called subscriber number" to the calling party through the front station.

In response to the announcement, the calling party inputs the telephone number of the called subscriber. The front station transfers the telephone number to the

pseudo internal signal generator 5, which transfers it to the SDL execution unit 2 through the queue manager 6.

According to the telephone number, the SDL execution unit 2 sends an initial addressing message IAM to the rear station. In response to the message IAM, the rear station calls the called subscriber and returns an addressing completion message ACM to the pseudo internal signal generator 5. In response to the message ACM, the pseudo internal signal generator 5 transfers an addressing completion message ACM to the SDL execution unit 2. If the called subscriber answers, the rear station sends an answer message ANM to the pseudo internal signal generator 5, which transfers it to the SDL execution unit 2. As a result, a speech channel is established by the called subscriber, and the channel is set in a busy state.

Once the speech is completed, the calling party hangs up the phone. The front station transfers a release message REL for releasing the channel to the pseudo internal signal generator 5, which transfers it to the SDL execution unit 2. In response to this, the SDL execution unit 2 sends a release completion message RLC indicating that the channel has been completely released, to the environment unit 1, and at the same time, a release message REL to the rear station. In response to the message REL, the rear station sends a release completion message RLC to the SDL execution unit 2. When this message RLC is received by the SDL execution unit 2, the series of processes ends.

In this way, signals are transferred between the environment unit 1 and the SDL execution unit 2 through the adapter 4. Accordingly, the OS 3 only assigns a task to the environment unit 1. This greatly reduces the overhead of the OS 3.

Figure 7 shows the pseudo internal signal generator 5, an IAM memory 35, the queue manager 6, and the SDL execution unit 2, to explain a normal operation of the

embodiment of the present invention. The pseudo internal signal generator 5 receives, for example, an initial addressing message IAM from the environment unit 1 and searches the IAM memory 35 according to messages msg\_1, msg\_2, and the like and parameters para\_1, para\_2, and the like related to the message IAM.

The IAM memory 35 holds a calling party number clig\_pty\_num, calling party category clig\_pty\_cat, etc. In the case of the parameter para\_1 of the message msg\_1, the calling party number clig\_pty\_num is set and transferred to the queue manager 6. The SDL execution unit 2 fetches the information from the queue manager 6 and carries out processes according to the information.

Figure 8 explains a separation operation of the embodiment of the present invention. The same reference marks as those of Fig. 7 represent like parts. Figure 8 additionally shows an ACM memory 36 and an ANM memory 37 to achieve the signal separation function of Fig. 2. If the pseudo internal signal generator 5 receives from the environment unit 1 three messages msg\_1 == IAM, msg\_2 == ACM, and msg\_3 == ANM, it sequentially searches the IAM memory 35, ACM memory 36, and ANM memory 37 according to a memory search parameter mem\_hunt.

According to parameters para\_1, para\_2, and para\_3, the pseudo internal signal generator 5 sets information and transfers the information to the queue manager 6. For example, if msg\_2 == ACM and para\_3 == ACM.bwd\_cal\_ind, the pseudo internal signal generator 5 sets data bwd\_cal\_ind (backward call indication) by searching the ACM memory 36 and transfers the data to the queue manager 6. Then, the SDL execution unit 2 sequentially fetches data from the queue manager 6 and carries out processes accordingly.

Figure 9 shows an integration operation of the embodiment of the present invention and corresponds to the signal integration function of Fig. 3. If end\_of\_msg == 0, the pseudo internal signal generator 5 waits for



the next initial addressing message IAM, and if  
end\_of\_msg == 1, the pseudo internal signal generator 5  
sends data to the queue. Namely, the calling party  
number clig\_pty\_num and calling party category  
5 clig\_pty\_cat are integrated, set, and transferred to the  
queue manager 6.

The normal operation of Fig. 7 involving a single  
message, the separation operation of Fig. 8 for  
separating a plurality of messages from one another, and  
10 the integration operation of Fig. 9 of integrating a  
plurality of messages into one may be combined in various  
ways to carry out the telephone service of Fig. 6 with  
the use of the pseudo internal signal generator 5 and  
queue manager 6.

15 As explained above, the present invention combines  
the execution unit 2 described in SDL with the external  
environment unit 1 described in a programming language  
such as C and C++ other than SDL through the adapter  
consisting of the pseudo internal signal generator 5 and  
20 queue manager 6. Then, the present invention transfers  
signals including messages, events, and parameters  
between the environment unit 1 and the SDL execution unit  
2 through the adapter without using communication  
controllers of the OS 3.

25 As a result, the OS 3 is not required to assign  
tasks to the SDL execution unit 2. This reduces the  
overhead of the OS 3. Since no communication controller  
of the OS is needed, no increase will be made in the  
overhead of the OS even if the number of signals  
30 transferred between the environment unit 1 and the SDL  
execution unit 2 increases. The environment unit 1 and  
SDL execution unit 2 may be prepared independently of  
each other without considering each other.

What is claimed is:

1. An information processing method for use with an SDL execution unit described in a specification and description language (SDL), an external environment  
5 description unit described in a programming language other than the SDL, and an adapter having a pseudo internal signal generator and a queue manager, the method comprising the steps of:

connecting the SDL execution unit and the  
10 external environment description unit to each other through the adapter so that signals containing at least one of messages, events, and parameters may be exchanged between the SDL execution unit and the external environment description unit through the adapter;

15 assigning a task of an operation system to the external environment description unit; and

executing the task so that the pseudo  
internal signal generator may convert and transfer the  
signals between the SDL execution unit and the external  
20 environment description unit.

2. The method of claim 1, wherein the step of  
executing the task includes the steps of:

receiving information to be transferred to  
the SDL execution unit from the external environment  
25 description unit, the information being received as function parameters for the pseudo internal signal generator;

converting the information by the pseudo  
internal signal generator into signals to be transferred  
30 to the SDL execution unit;

transferring the converted signals to the  
queue manager;

monitoring an internal queue of the queue  
manager; and

35 activating, if the internal queue is holding the converted signals, the SDL execution unit by a function call so that the activated SDL execution unit

may fetch the converted signals from the internal queue and carry out processes accordingly.

3. An information processing apparatus for processing information under the control of a task assigned by an operation system, comprising:

an adapter for connecting an SDL execution unit described in a specification and description language (SDL) and an external environment description unit described in a programming language other than the SDL to each other so that signals may be transferred between the SDL execution unit and the external environment description unit through the adapter under a task assigned by the operation system to the external environment description unit, the adapter having:

a pseudo internal signal generator for separating, integrating, and converting signals to be transferred between the SDL execution unit and the external environment description unit; and

a queue manager having an internal queue for holding the signals to be transferred between the SDL execution unit and the external environment description unit.

INFORMATION PROCESSING METHOD AND  
INFORMATION PROCESSING APPARATUS

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ABSTRACT OF THE DISCLOSURE

10 An information processing apparatus has an SDL  
execution unit described in a specification and  
description language (SDL), an external environment  
description unit described in a programming language  
other than the SDL, and an adapter having a pseudo  
15 internal signal generator and a queue manager. A task of  
an operation system is assigned to the external  
environment description unit, which is combined with the  
SDL execution unit through the adapter. The pseudo  
20 internal signal generator converts signals including  
messages, events, and parameters to be transferred  
between the SDL execution unit and the external  
environment description unit. The converted signals are  
transferred between the SDL execution unit and the  
25 external environment description unit through the queue  
manager. Also provided is an information processing  
method to materialize the information processing  
apparatus. These method and apparatus reduce the  
overhead of the operation system.

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: Yumi SUZUKI et al.

Filed: : Concurrently herewith

For : INFORMATION PROCESSING METHOD AND INFORMATION  
PROCESSING APPARATUS

Serial No.: Concurrently herewith

September 29, 1998

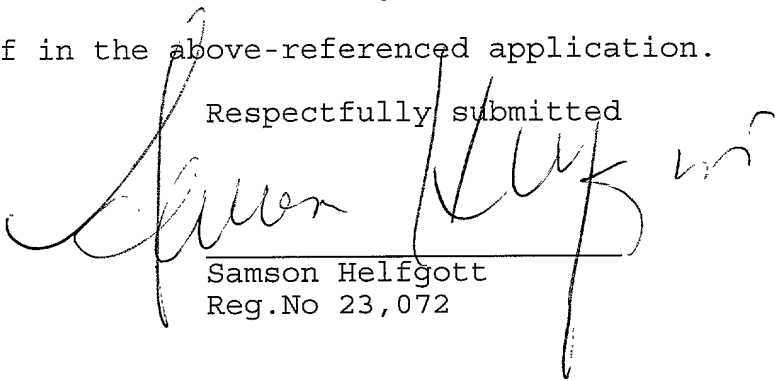
Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

SUB-POWER OF ATTORNEY

S I R:

I, Samson Helfgott Reg. No. 23,072 attorney of record  
herein, do hereby grant a sub-power of attorney to Russell  
Gross, Reg. No. 40,007 and Linda S. Chan, Reg. No. 42,400 to  
act and sign in my behalf in the above-referenced application.

Respectfully submitted

  
Samson Helfgott  
Reg.No 23,072

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By J. Gonzalez

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Fig.1

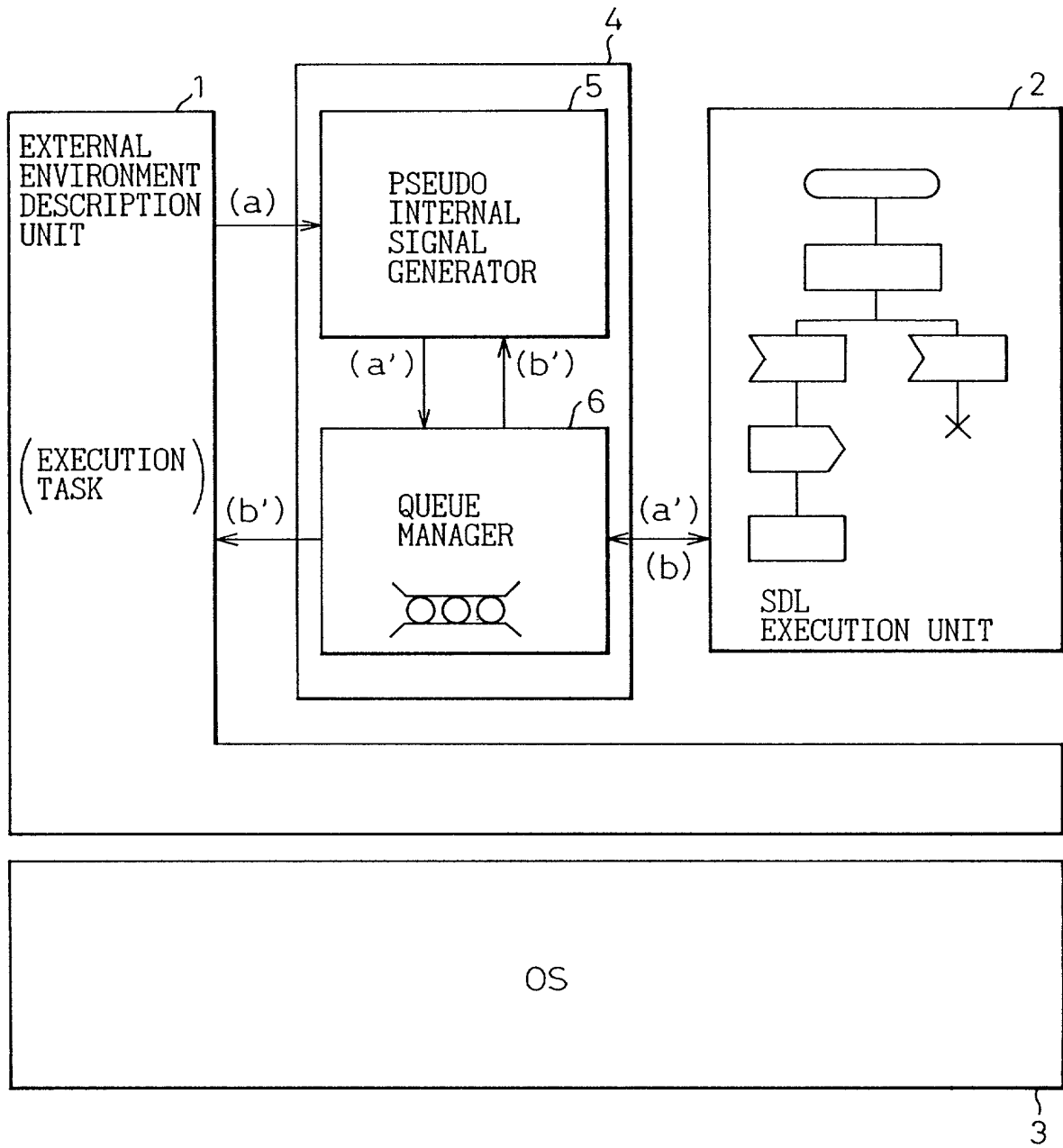


Fig.2

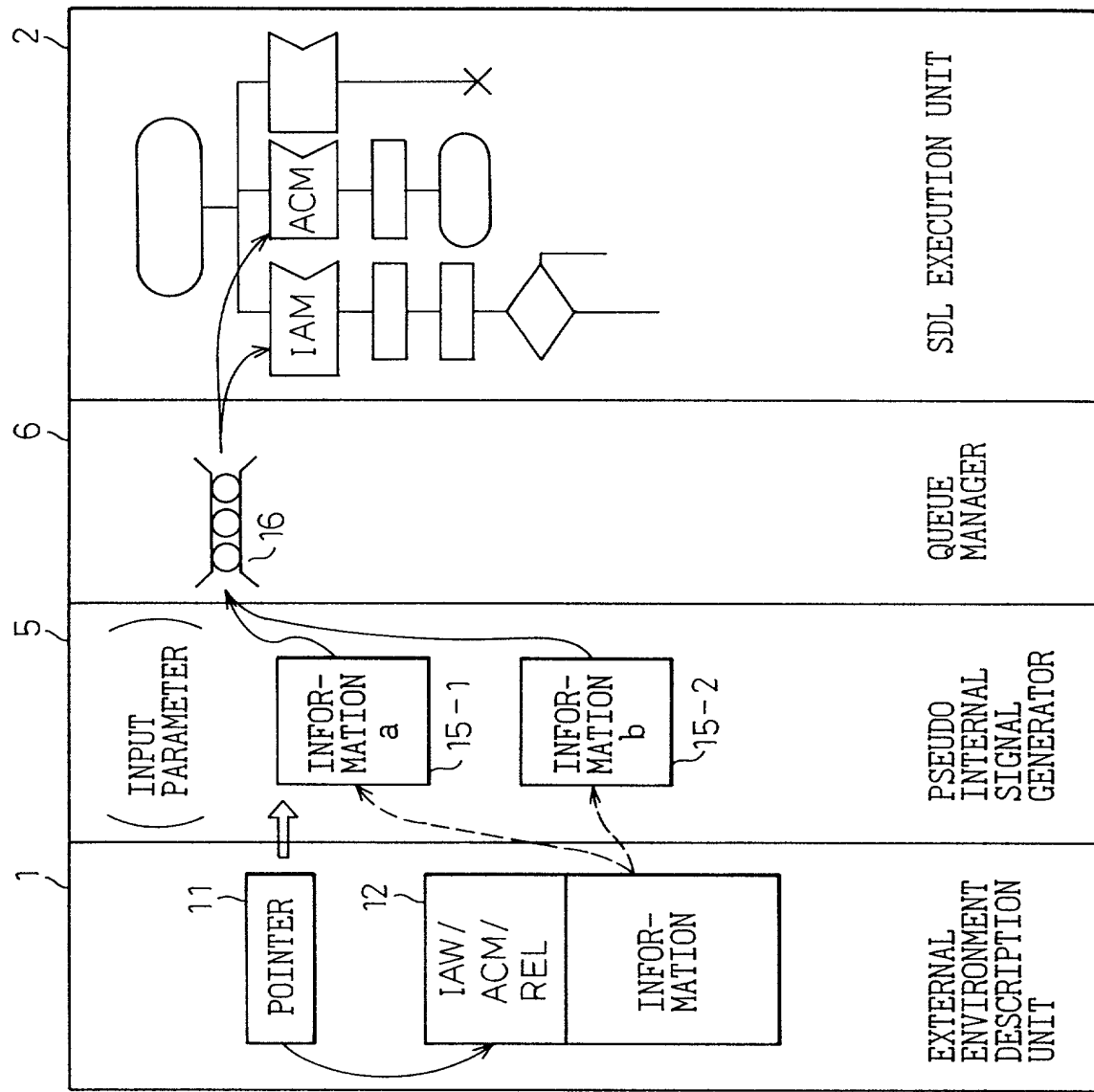


Fig.3

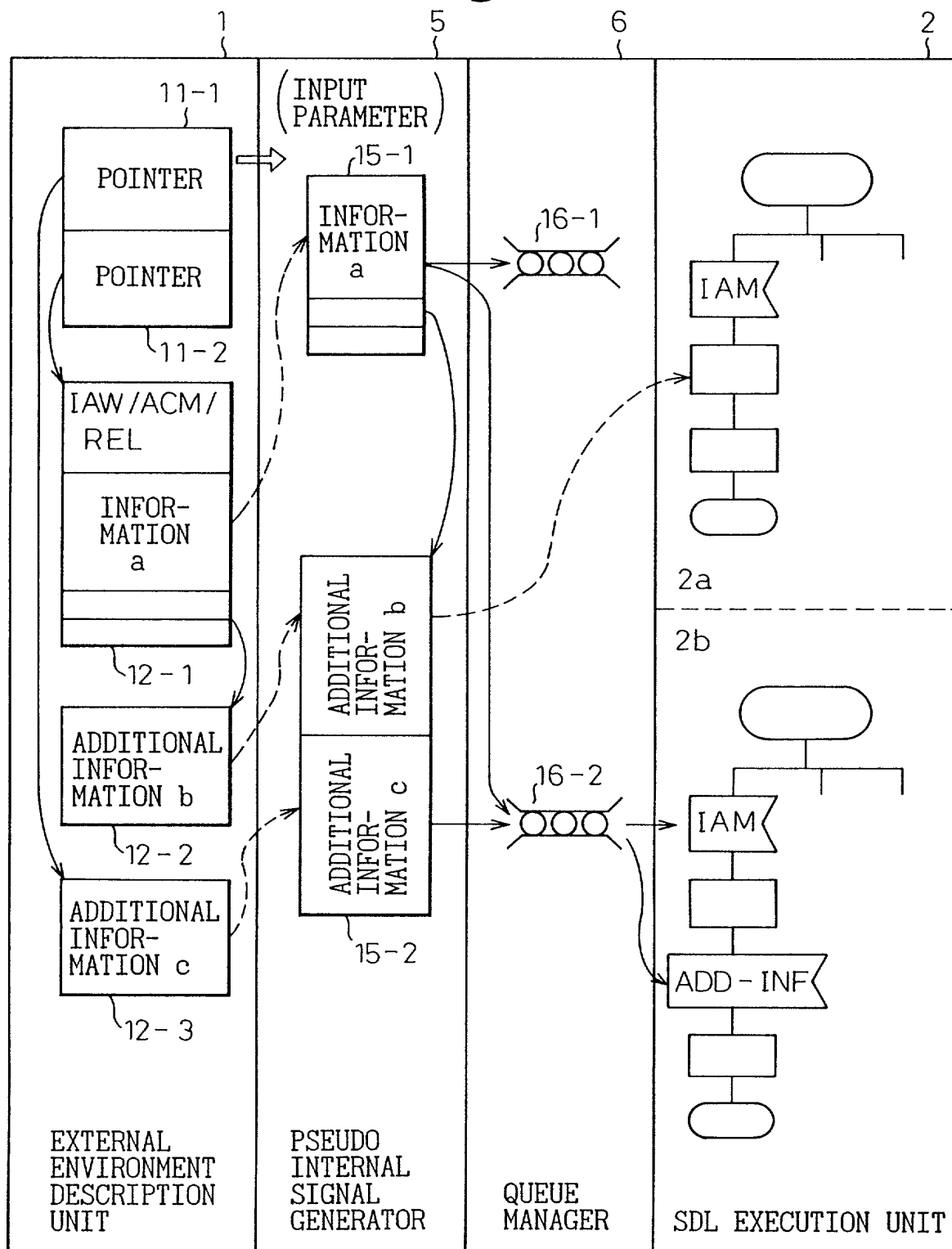




Fig.4

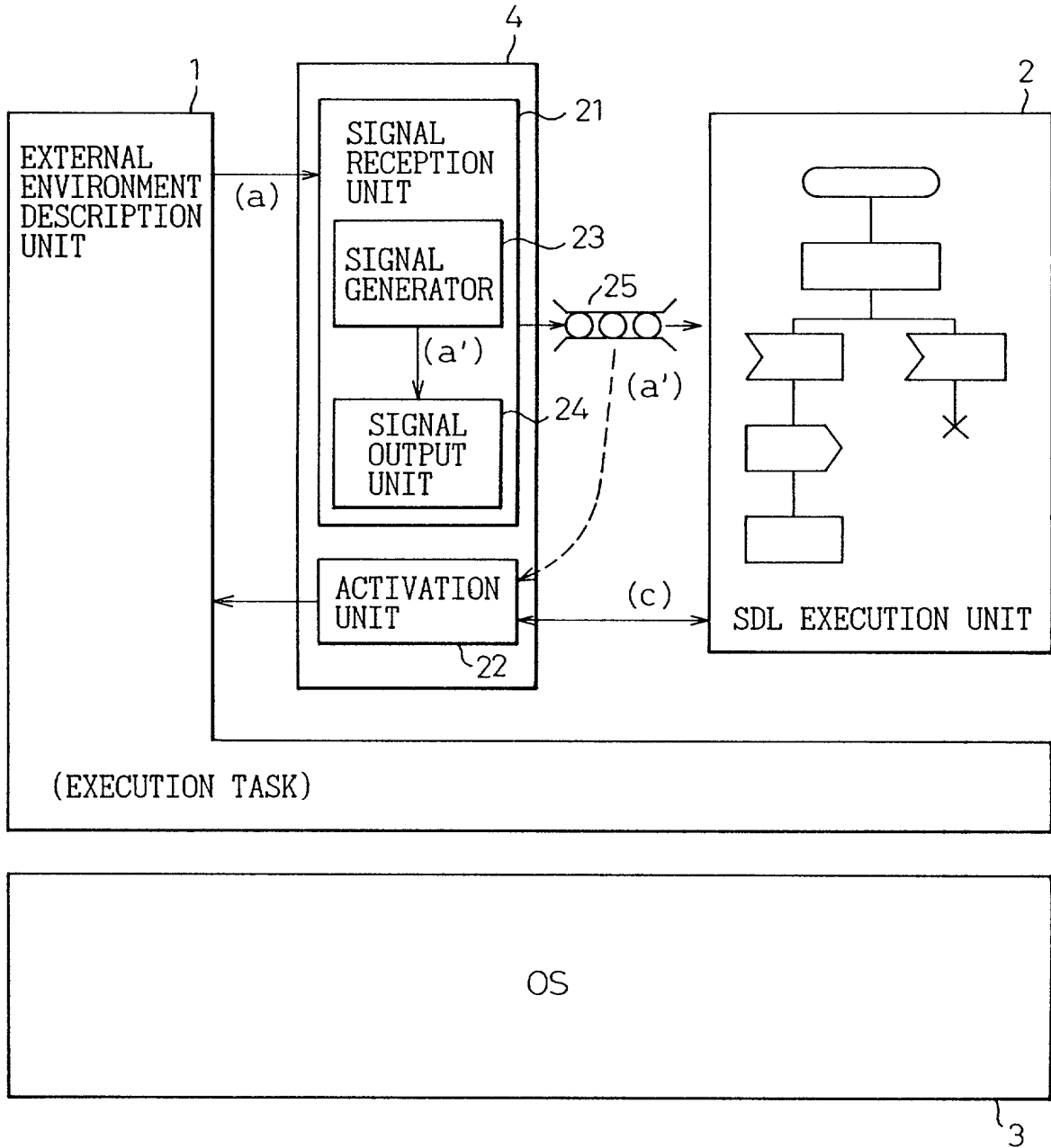


Fig.5

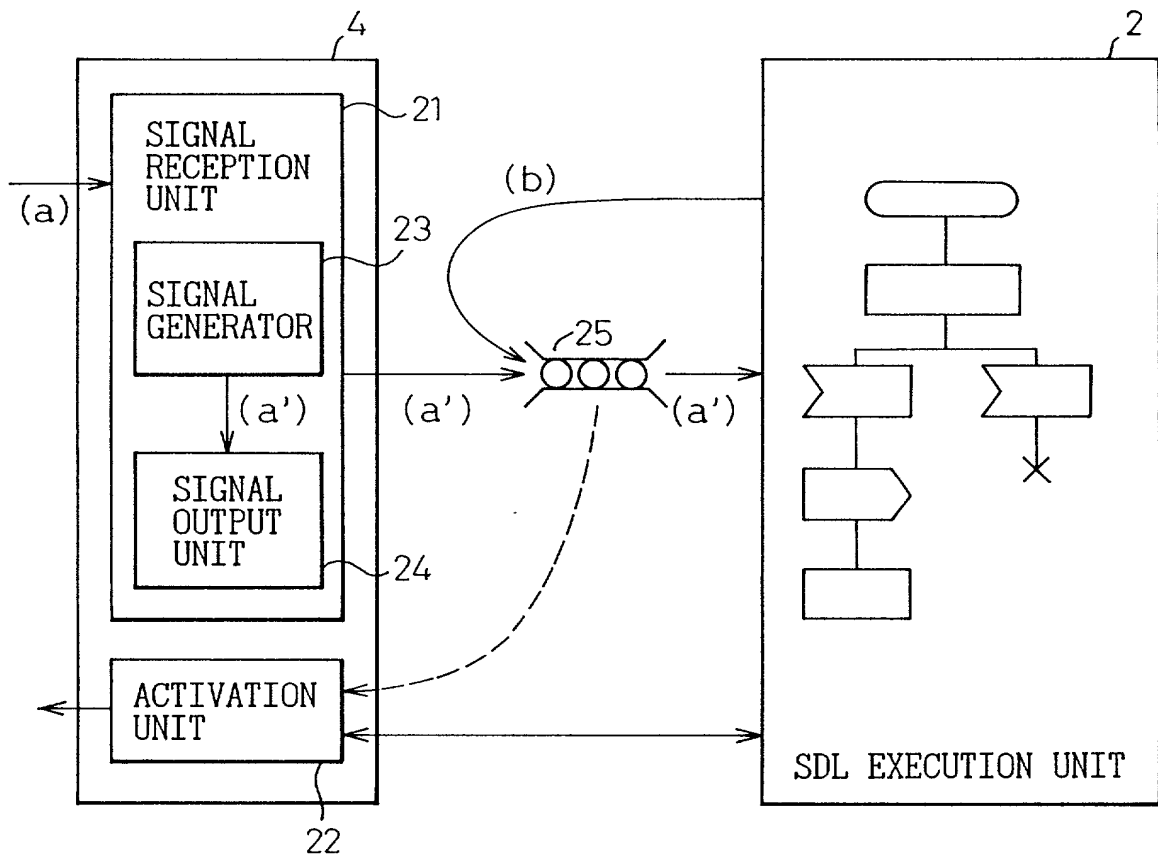


Fig.6

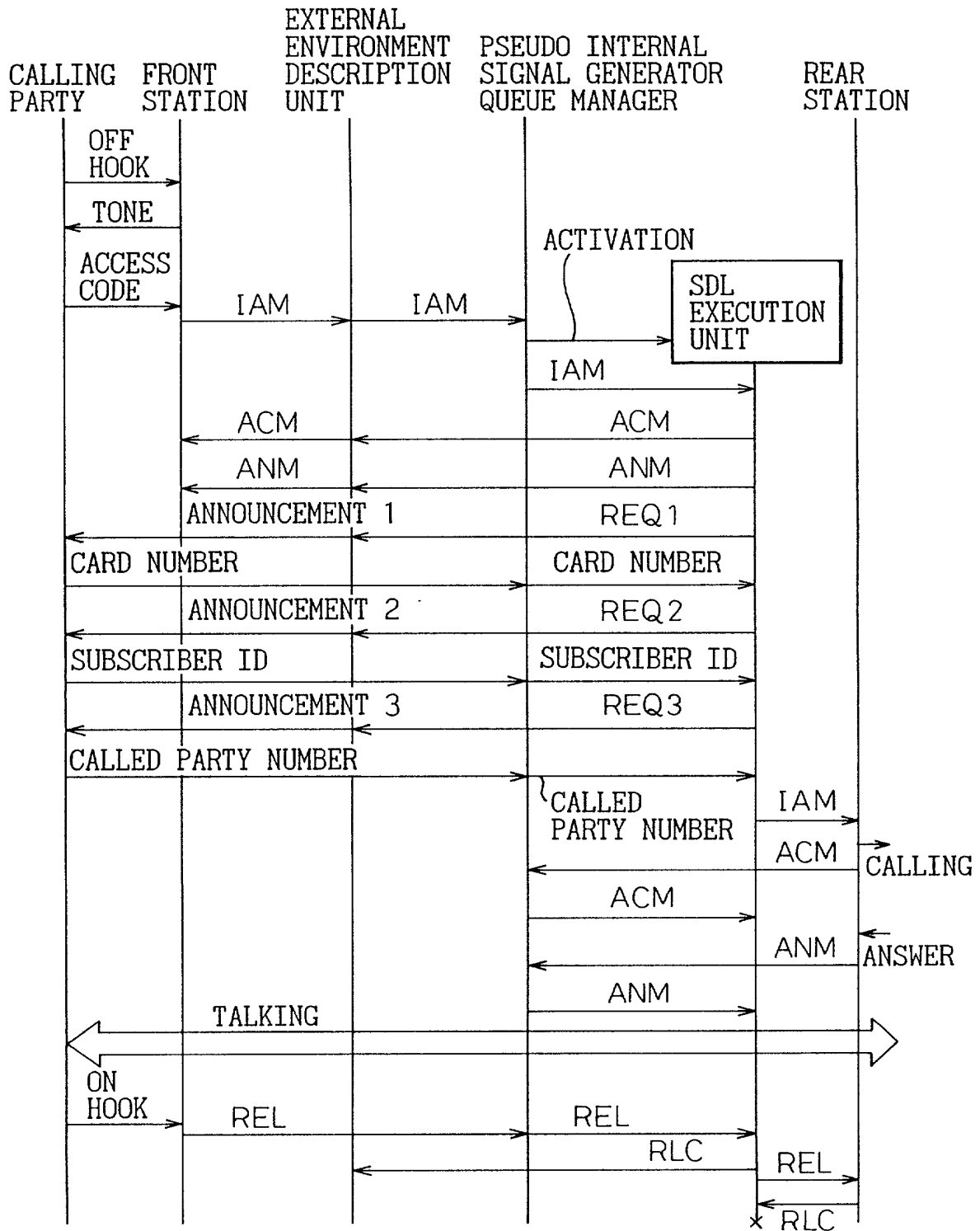


Fig.7

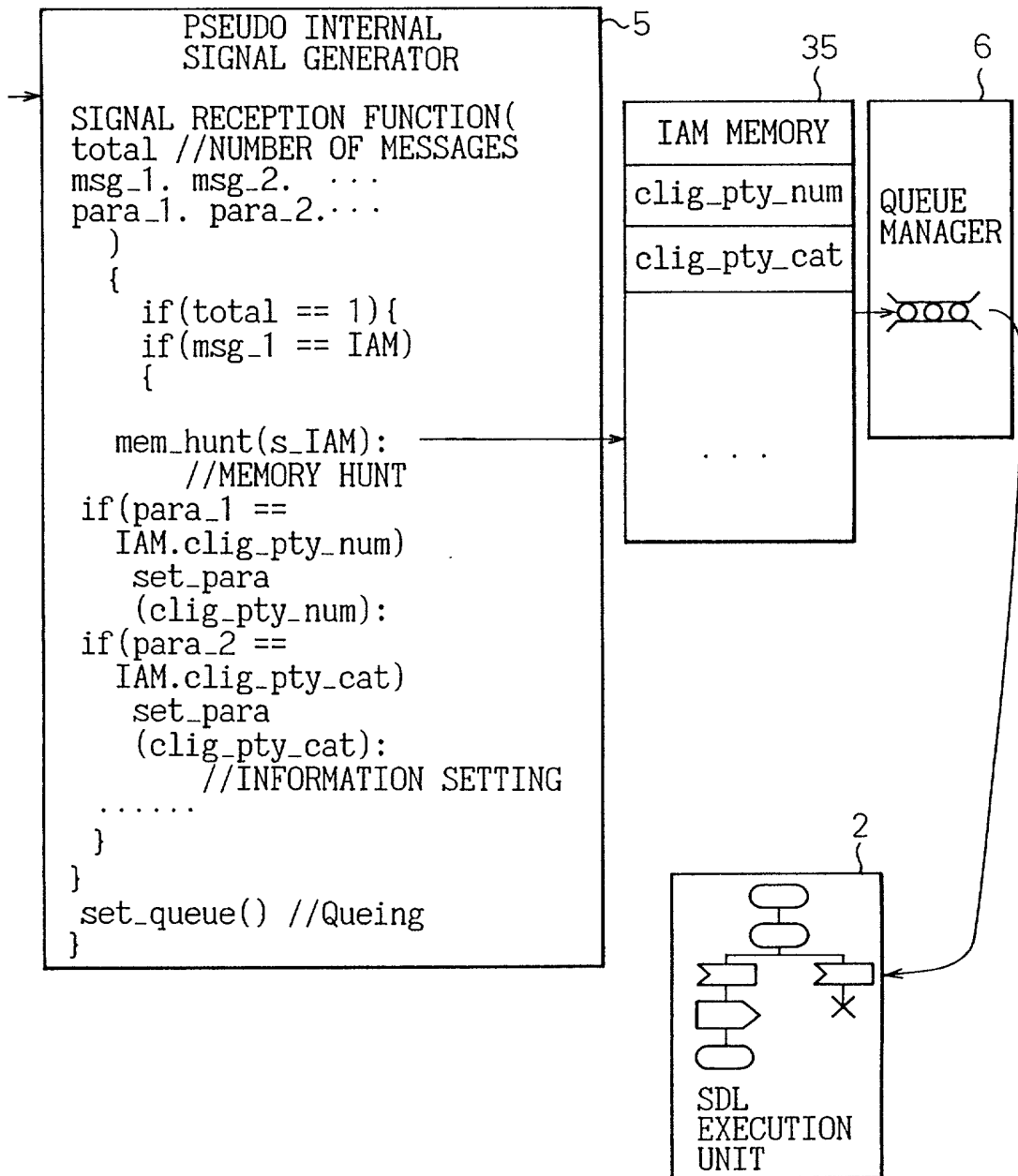


Fig.8

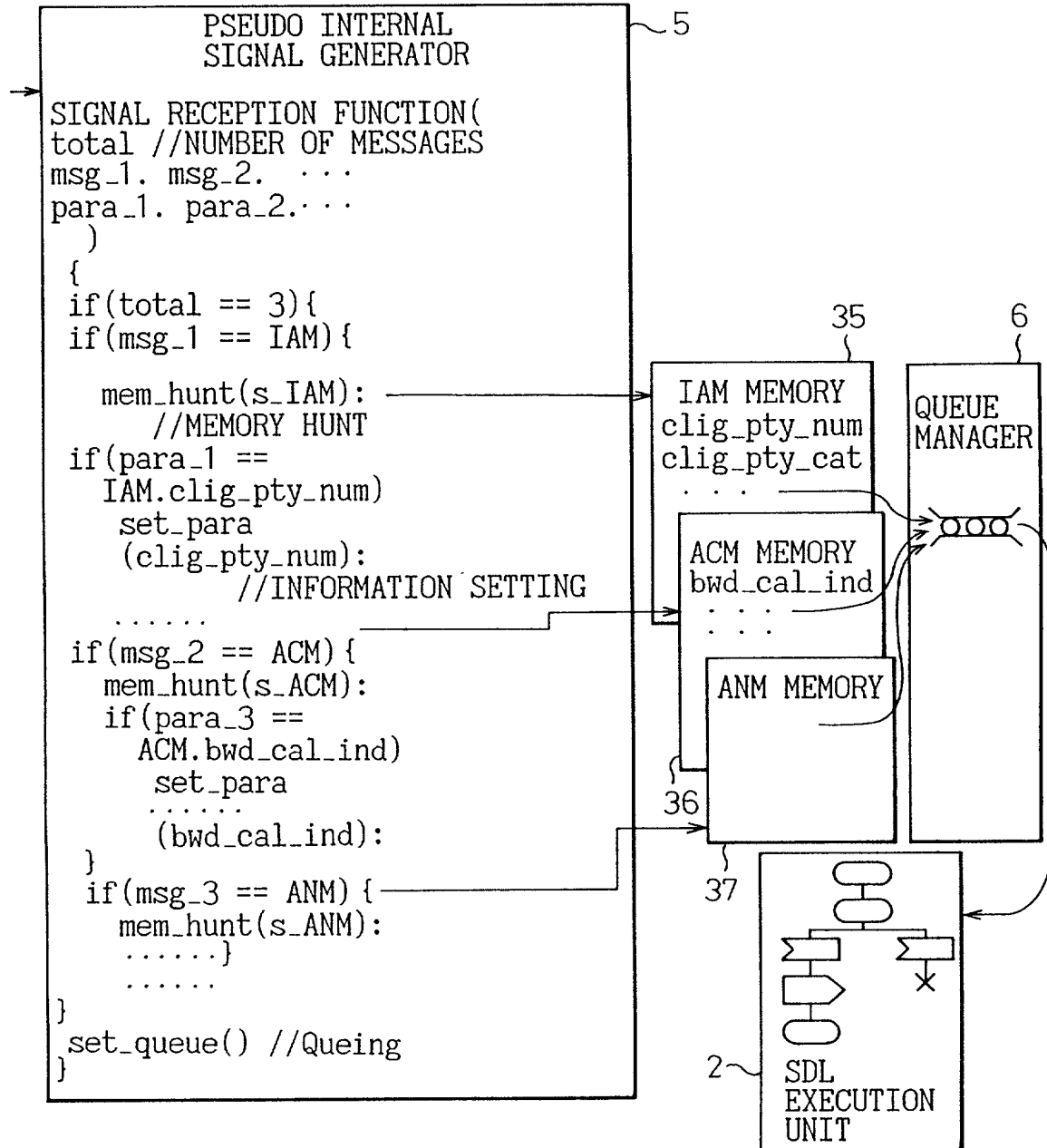


Fig.9

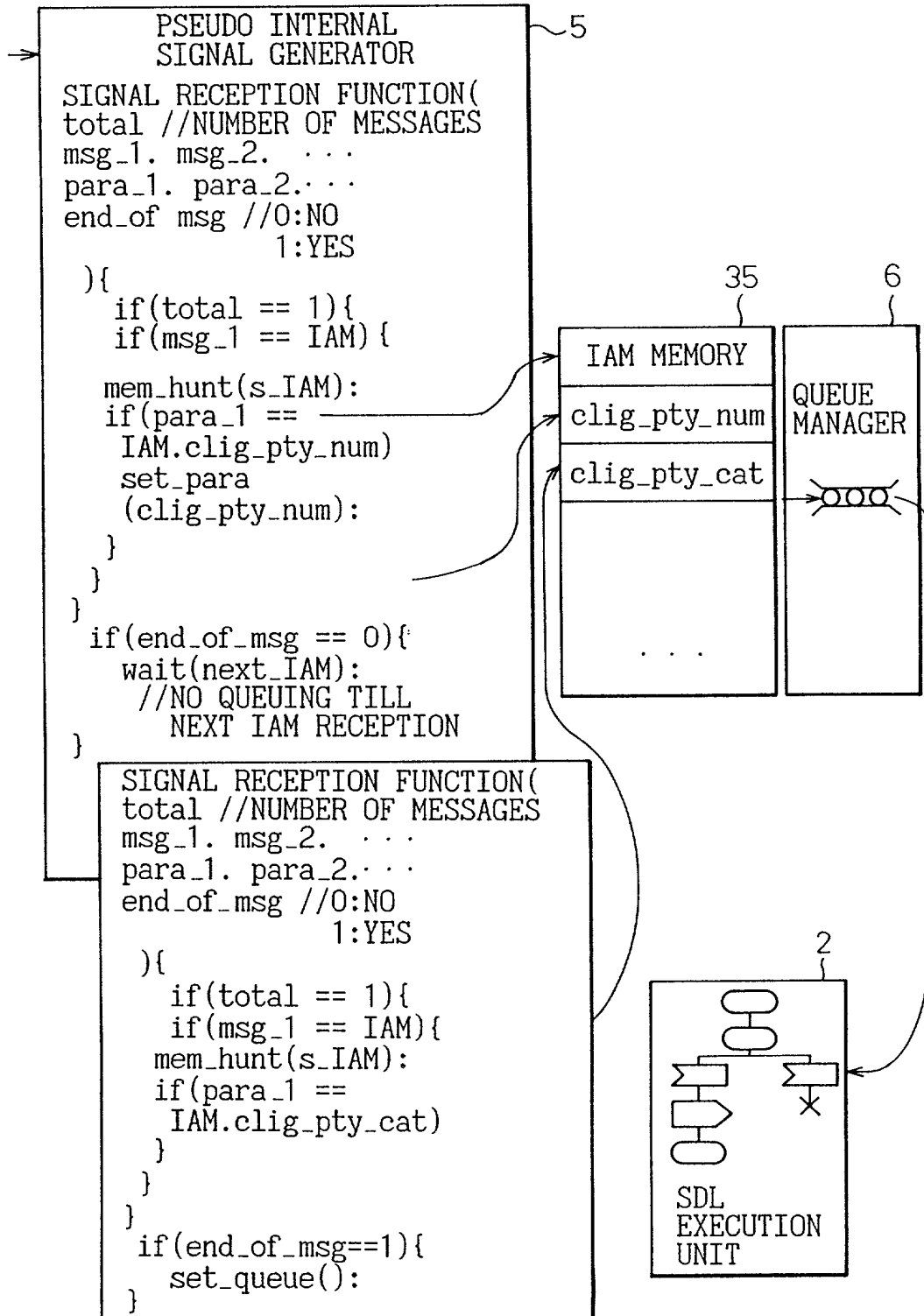
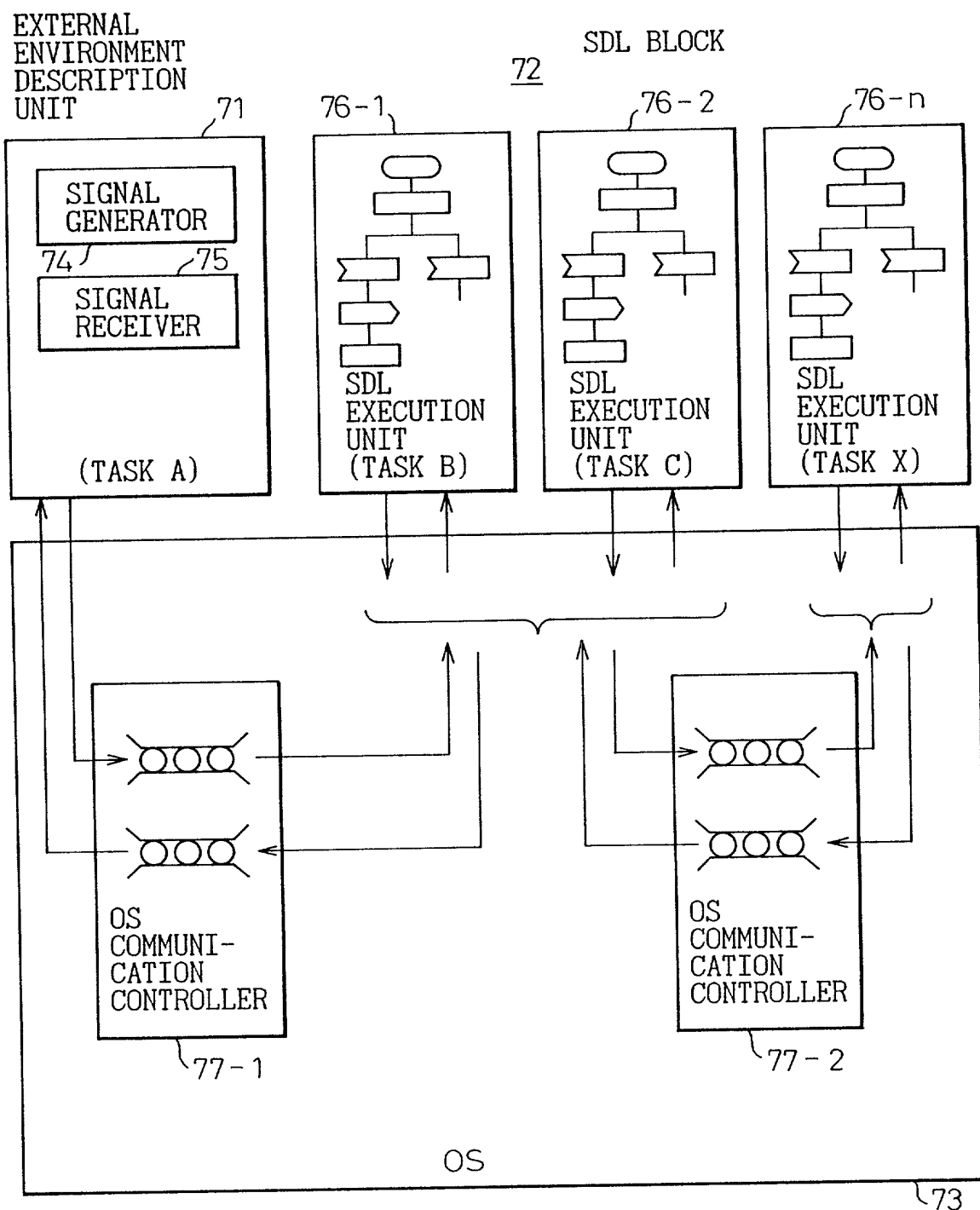


Fig.10  
PRIOR ART



## Declaration and Power of Attorney For Patent Application

## 特許出願宣言書及び委任状

## Japanese Language Declaration

## 日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

## INFORMATION PROCESSING METHOD AND

## INFORMATION PROCESSING APPARATUS

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ 月 日に提出され、米国出願番号または特許協定条約国際出願番号を \_\_\_\_\_ とし、  
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☐ was filed on \_\_\_\_\_  
as United States Application Number or  
PCT International Application Number  
\_\_\_\_\_ and was amended on  
\_\_\_\_\_ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

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I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.



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私は、米国法典第35編119条(a)-(d)項又は365条(b)項に基づき下記の、米国以外の国の少なくとも一カ国を指定している特許協力条約365(a)項に基づき国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

### Prior Foreign Application(s)

外国での先行出願 10-128835(Pat.Appln.)	Japan
(Number) (番号)	(Country) (国名)
(Number) (番号)	(Country) (国名)

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

### Priority Not Claimed

優先権主張なし

12/May/1998

(Day/Month/Year Filed)  
(出願年月日)

(Day/Month/Year Filed)  
(出願年月日)

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(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

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(Application No.)  
(出願番号)

(Filing Date)  
(出願日)

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(出願番号)

(Filing Date)  
(出願日)

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(Status: Patented, Pending, Abandoned)  
(現況: 特許許可済、係属中、放棄済)

(Status: Patented, Pending, Abandoned)  
(現況: 特許許可済、係属中、放棄済)

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委任状: 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。(弁護士、または代理人の氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number)

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(Supply similar information and signature for third and subsequent joint inventors.)

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住 所	Residence		
国 籍	Citizenship		
私書箱	Post Office Address		

第五共同発明者	Full name of fifth joint inventor, if any		
第五共同発明者	日付	Fifth inventor's signature	Date
住 所	Residence		
国 籍	Citizenship		
私書箱	Post Office Address		
第六共同発明者	Full name of sixth joint inventor, if any		
第六共同発明者	日付	Sixth inventor's signature	Date
住 所	Residence		
国 籍	Citizenship		
私書箱	Post Office Address		

(第七以降の共同発明者についても同様に  
記載し、署名をすること)

(Supply similar information and signature for  
seventh and subsequent joint inventors.)